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(54) Abstract Title
Support structure for a spindle motor of a compact disc machine

(57) Support structure for a spindle motor of a compact disc machine comprising: a shaft 21, a rotor base 22 and a support plate 23. The shaft is positioned through the central holes of both the rotor base and support plate and the optical disc is placed on the support plate. An elastic material 24 is casted or injection-molded to bind the shaft, the rotor base and the support plate, so they are securely joined. Also, the elastic material can have a plurality of hooks (749, 747 in fig. 7) arranged in a circular form over which the central hole of the disc is positioned and the hooks secure the disc on the support structure.

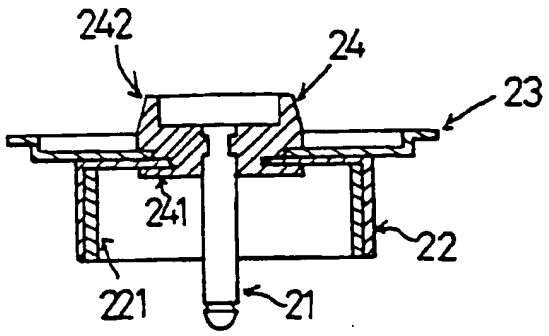

FIG.2

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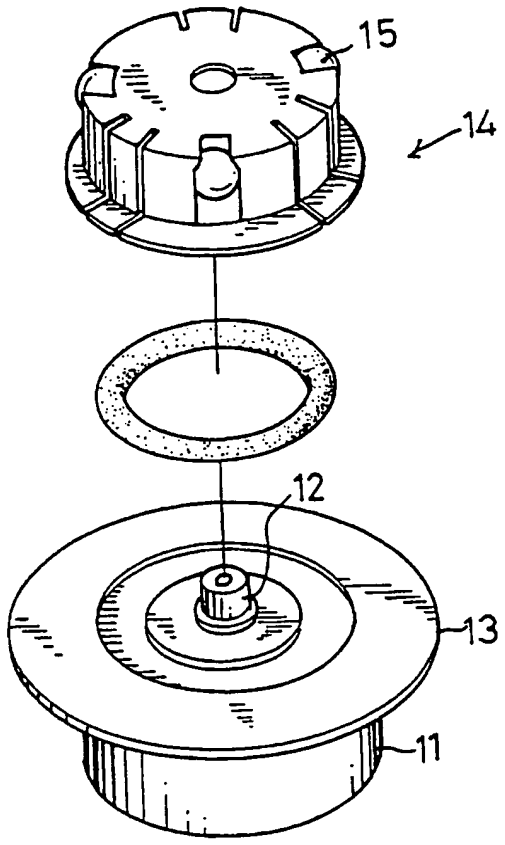

FIG.1

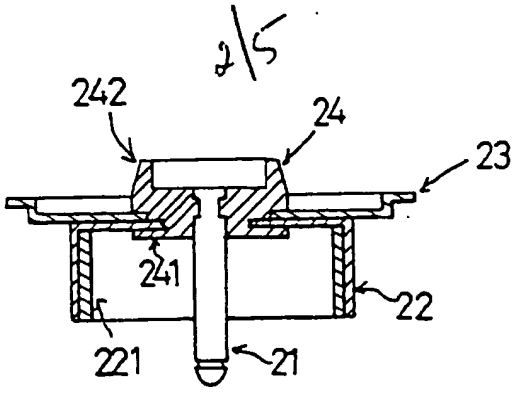

FIG.2

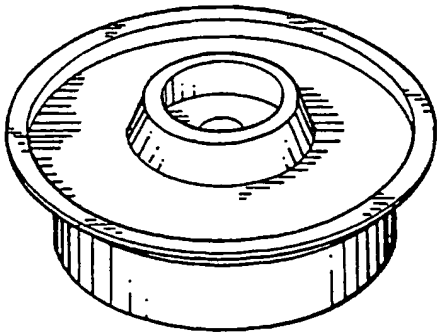

FIG.4

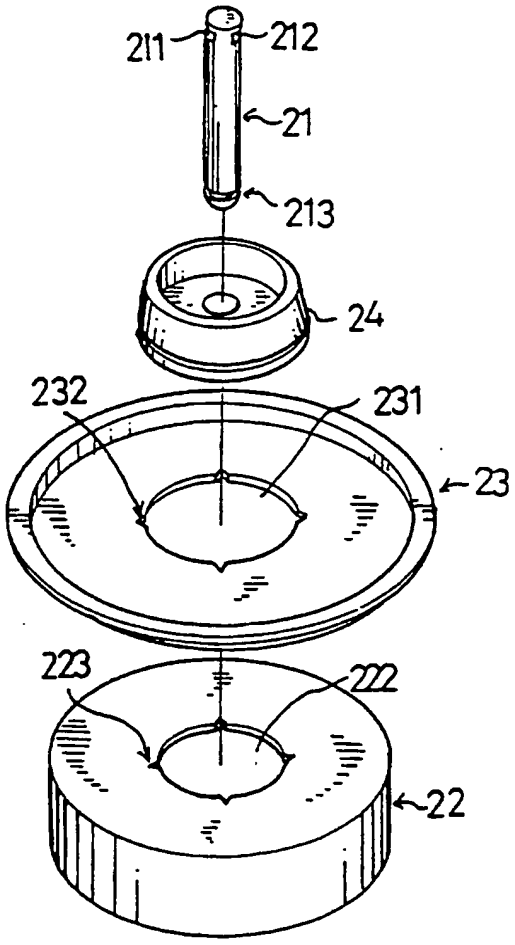

FIG.3

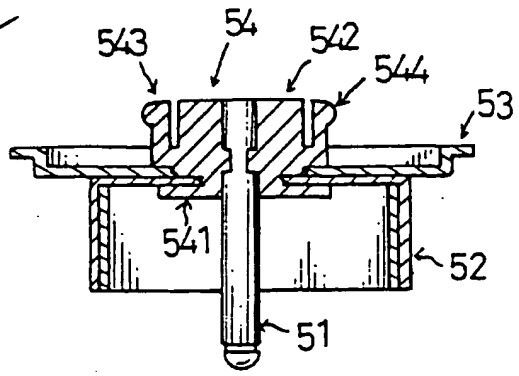

FIG.5

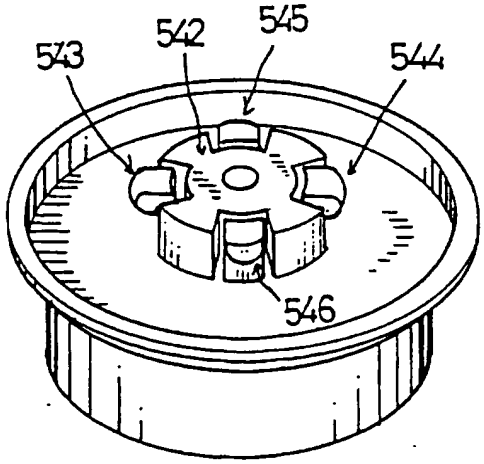

FIG.6

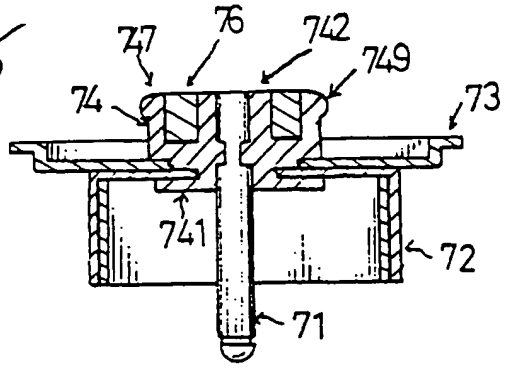

FIG.7

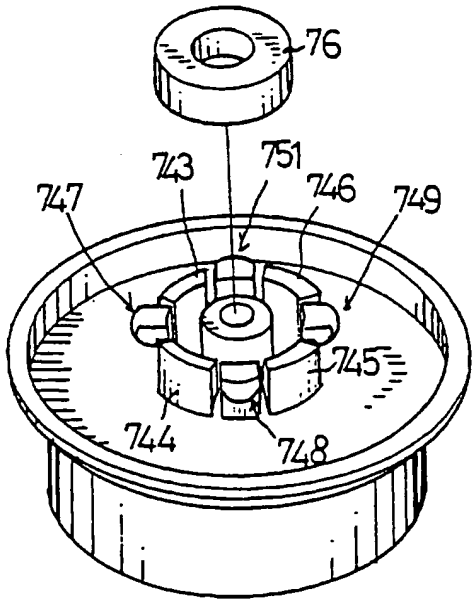

FIG.8

TITLE

SUPPORT STRUCTURE FOR A SPINDLE MOTOR OF

A COMPACT DISC MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention:

The invention relates to a support structure for a disc, particular to a support structure for a spindle motor of a compact disc machine.

2. Description of the Prior Art

Fig. 1 shows the conventional support structure for a spindle motor of a compact disc machine. The support structure comprises: a rotor base 11, a shaft 12 and a support plate 13. There is a magnet ring mounted inside the rotor base 11, producing an electromagnetic induction with the electromagnetic coil, and rotating the rotor base 11. The shaft 12 is placed in the bearing of a stator structure such that the rotor base 11 rotates in a fixed axle. The conventional binding method is to utilize metal plate press to bind the rotor base 11, the shaft 12 and the support plate 13. However, such binding method is incapable of achieving the degree of precision requirement. Neither does its result meet the demands of the set standard. After a period of usage, common defects, such as looseness and separation between the elements, may occur. Accordingly, long term of the support structure cannot be guaranteed. Furthermore, during the manufacturing process, the shaft 12 has a tendency to incline, causing the support structure to vibrate at rotation. Such vibration may result in a eccentric vibration of the rotor base, thus accelerating the possibility of looseness and separation between the elements.

On the other hand, the support structure has a plastic circular hub 14 which is mounted in a center of the support structure, and is placed in a central hole of the disc in order to fix the disc onto the support structure. A plurality of notches appear on a circumference of the plastic circular hub 14, and each notch is able to contain a little steel ball 15. In addition, there is a rubber ring in the plastic circular hub 14 to resist the little steel ball 15, providing the little steel ball 15 with elasticity. The circular shape of the little steel ball 15 can be utilized to lock a circumference of the hole of a disc. However, the rubber ring detaches easily such that the little steel ball 15 can not fix the disc onto the support structure. Therefore, it is necessary to provide a novel support structure to overcome the above problems.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a support structure for a spindle motor of a compact disc machine such that the elements of the support structure can be securely joined.

Another object of the present invention is to provide a support structure for a spindle motor of a compact disc machine such that the support structure is able to precisely rotate in a fixed axle, and avoid vibration at rotation.

Still another object of the present invention is to provide a support structure for a spindle motor of a compact disc machine such that the disc can be tightly locked onto the support structure.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded view of the conventional support structure for a spindle motor of a compact disc machine.

Fig. 2 is a cross-section and schematic view of the first embodiment of the invention.

Fig. 3 is an exploded view of the first embodiment of the invention.

Fig. 4 shows one configuration of the first embodiment of the invention.

Fig. 5 is a cross-section and schematic view of the second embodiment of the invention.

Fig. 6 shows one configuration of the second embodiment of the invention.

Fig. 7 is a cross-section and schematic view of the third embodiment of the invention.

Fig. 8 shows one configuration of the third embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

Fig. 2 shows a support structure for a spindle motor of a compact disc machine comprising: a shaft 21, a rotor base 22 and a support plate 23. Referring to Fig. 3, we can understand the structure of the above elements. There are two notches, 211 and 212, on a circumference at an end of the shaft 21. The other end of the shaft 21 has an annular groove 213 such that a C-shape ring (not shown) can be mounted into it. This will fix the shaft 21 after it is placed in the bearing (not shown) of a stator structure. A magnet ring 221 circularly fixes around the inside of the rotor base 22. The magnet ring 221 produces electromagnetic induction with the electromagnetic coil (not shown) of

the stator to rotate the rotor base 22. There is a hole 222 on the center of the rotor base 22, and its purpose is to accommodate for the shaft 21. There are four notches 223 formed around the circumference of the hole 222. The support plate 23 mounted on the rotor base 22 can support the disc. There is a hole 231 on a center of the support plate 23 for accommodating the shaft 21. There are four notches 232 formed around the circumference of the hole 231.

The shaft 21 is placed in a suitable position of the hole 222 of the rotor base 22 and the hole 231 of the support plate 23. An elastic material is casted or injection-molded to bind the shaft 21, the rotor base 22 and the support plate 23. The elastic material may be plastic, aluminum or bakelite, etc. The elastic material described in the embodiments is plastic. The plastic 24 is injection-molded to bind the shaft 21, the rotor base 22 and the support plate 23. The shaft 21, the rotor base 22, the support plate 23 and the plastic 24 can be joined more securely by the notches 211 and 212 of the shaft 21, the notch 223 of the rotor base 22 and the notch 232 of the support plate 23. Such a combination makes the shaft 21 position precisely on the center of the rotor base 22 and the support plate 23, and avoids the unstable factors of the conventional technique such as press. Besides, the injection-molded plastic 24 binds the shaft 21, the rotor base 22 and the support plate 23 such that the combined force between the elements is so strong that the danger of looseness and the separation between the elements is eliminated.

The plastic 24 comprises: a substructure 241 and a circular hub 242. The substructure 241 securely binds the shaft 21, the rotor base 22 and the support plate 23. The circular hub 242 extends upwardly from the substructure 241 and

is placed in the central hole of the disc.

As shown in Fig. 4, the support plate can be manufactured from the elastic material at the same time when the elastic material is casted or injection-molded. This means the support structure can be formed by less elements and less processes, thus efficiency is named.

Referring to Fig. 5 and Fig. 6, the features of the second embodiment of the invention can be understood. The support structure of the second embodiment comprises: a shaft 51, a rotor base 52 and a support plate 53. The features of the above elements are the same as those of the elements of the first embodiment. The injection-molded plastic 54 can also securely bind the shaft 51, the rotor base 52 and the support plate 53. The injection-molded plastic 54 comprises: a substructure 541 and a central hub 542. The substructure 541 securely binds the shaft 51, the rotor base 52 and the support plate 53. The central hub 542 is cylindrical in shape, extending upwardly from the substructure 541 and clips into the central hole of the disc. There are four notches on a circumference of the central hub 542. Each notch receives a hook. The hooks 543, 544, 545 and 546 extend upwardly from the substructure 541 and lock the circumference of the central hole of the disc. The hooks are slightly q-shaped. A protrusion forms on the top of the outer side of the hook. The outer diameter of the protrusion of the hooks is slightly largely than the inner diameter of the central hole of the disc, such that the disc can be locked and fixed onto the support structure.

Referring to Fig. 7 and Fig. 8, the features of the third embodiment of the invention can be understood. The support structure of the third embodiment

comprises: a shaft 71, a rotor base 72 and a support plate 73. The features of the above elements are the same as those of the elements of the first embodiment. The injection-molded plastic 74 is also capable of binding the shaft 71, the rotor base 72 and the support plate 73 in a secure fashion. The injection-molded plastic 74 comprises: a substructure 741, a central portion 742 and four blade-shape elements 743, 744, 745 and 746. The substructure 741 securely binds the shaft 71, the rotor base 72 and the support plate 73. The central portion 742 extends upwardly from the substructure 741 and encloses the shaft 71. The four blade-shape elements 743, 744, 745 and 746 extend upwardly from the substructure 741 and form an arch curve. A ring space is defined between the blade-shape elements and the central portion 742. A notch is defined between the two blade-shape elements. Each notch receives a hook. The hooks 747, 748, 749 and 751 extend upwardly from the substructure 741, and are designed to lock into the circumference portion of the central hole of the disc. The hooks are slightly q-shaped. A protrusion forms on the top of the outer side of the hooks. The outer diameter of the protrusion of the hooks is slightly larger than the inner diameter of the central hole of the disc, thus allowing the disc to be locked and fixed onto the support structure.

A ring elastic element may be placed inside the ring space. The ring elastic element described in the embodiment is a rubber. The rubber 76 can prevent the hooks from losing elasticity. The rubber 76 can resist the hooks such that the hooks can tightly lock the disc onto the support structure. Besides, a plurality of protrusions (not shown) extend toward the center point and form on the top of the inner side of the blade-shaped elements 743, 744, 745 and 746, to prevent

the rubber 76 from slipping away during rotation.

While particular embodiments of the present invention have been illustrated and described, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended to cover in the appended claims all such modifications that are within the scope of the invention.

CLAIMS

1. A support structure for a spindle motor of a compact disc machine, comprising:

a shaft having a plurality of notches formed on a circumference at an end of the shaft;

a rotor base with a hole in its centre for the accommodation of the shaft, a plurality of notches formed around the hole of the rotor base; and

a support plate for the disc which is placed on the rotor base, a hole in the centre of the support plate for accommodation of the shaft, a plurality of notches formed around the hole of the support plate;

wherein the shaft is placed in the holes of the rotor base and the support plate, an elastic material is casted or injection-moulded to bind the shaft, the rotor base and the support plate, such that the shaft, the rotor base, the support plate and the elastic material can be bound securely by the notches of the shaft, the rotor base and the support plate.

2. A support structure for a spindle motor of a compact disc machine, comprising:

a shaft;

a rotor base with a hole in its centre to accommodate the shaft; and

a support plate for supporting the disc and placed on the rotor base, with a hole in the centre of the support plate to accommodate the shaft;

wherein the shaft is placed in the holes of the rotor base and the support plate, an elastic material is casted or injection-moulded to bind the shaft, the rotor base and support plate such that the shaft, the rotor base, the support plate and the elastic material are securely joined, the elastic material comprises:

a substructure to securely bind the shaft, the rotor base and the support plate;

a central portion extending upwardly from the substructure; and

a plurality of blade-shape elements extending upwardly from the substructure and forming an arcuate curve, a ring space defined between the blade-shape elements and the central portion, a notch defined between the two blade-shape elements, with each notch receiving a hook, and a plurality of hooks extending upwardly from the substructure to lock on to a circumference of a central hole of the disc.

3. A support structure for a spindle motor of a compact disc machine, comprising:

a shaft;

a rotor base with a hole in its centre in order to accommodate the shaft; and

a support plate for supporting the disc and placed on the rotor base, with a hole in a centre of the support plate to accommodate the shaft;

wherein the shaft is placed in the holes of the rotor base and the support plate, an elastic material is casted or injection-moulded to bind the shaft, the rotor base and the support plate, such that the shaft, the rotor base, the support plate and the elastic material are securely joined, the elastic material comprises:

a substructure to securely bind the shaft, the rotor base and the support plate;

a central hub extending upwardly from the substructure to be placed in a central hole of a disc, a plurality of notches formed on a circumference of the central hub, with each notch receiving a hook, the hooks extending upwardly from the substructure and locking on to a circumference of the central hole of the disc.

4. The support structure as claimed in claim 2 or 3, wherein a protrusion is formed on a top of an outer side of the hook, for locking and fixing the disc on to the support structure.

5. A support structure for a spindle motor of a compact disc machine, comprising:

a shaft;

a rotor base with a hole in its centre to accommodate the shaft; and

a support plate for supporting the disc and placed on the rotor base, with a hole in a centre of the support plate to accommodate the shaft;

wherein the shaft is placed in the holes of the rotor base and the support plate, an elastic material is casted or injection-moulded to bind the shaft, the rotor base and the support plate such that the shaft, the rotor base, the support plate and the elastic material are securely bound, the elastic material comprises:

a substructure to securely bind the shaft, the rotor base and the support plate;

a circular hub extending upwardly from the substructure to be placed in the central hole of the disc.

6. The support structure as claimed in any one of claims 2 to 5, wherein the support plate is manufactured using the elastic material at the same time as the elastic material is casted or injection-moulded.

7. The support structure as claimed in any one of claims 2 to 6, wherein a plurality of notches are formed on a circumference at an end of the shaft, a plurality of notches are formed around the hole of the rotor base, and a plurality of notches are formed around the hole of the support plate; the shaft, the rotor base, the support plate and the elastic material are bound more securely by the notches on the shaft, the rotor base and the support plate.

8. The support structure as claimed in any one of claims 2 to 7, wherein a ring elastic element is placed inside the ring space to prevent the hooks from losing elasticity.

9. The support structure as claimed in claim 8, wherein a plurality of protrusions extend toward the centre point and formed on a top of a inner side of the blade-shape elements to prevent the ring elastic element from slipping away during rotation.

10. A support structure for a spindle motor of a compact disc machine, substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

Amendments to the claims have been filed as follows

CLAIMS

1. A support structure for a spindle motor of a compact disc machine, comprising:

a shaft having a plurality of notches formed on a circumference at an end of the shaft;

a rotor base with a hole in its centre for the accommodation of the shaft, a plurality of notches formed around the hole of the rotor base; and

a support plate for the disc which is placed on the rotor base, a hole in the centre of the support plate for accommodation of the shaft, a plurality of notches formed around the hole of the support plate;

wherein the shaft is placed in the holes of the rotor base and the support plate, an elastic material is casted or injection-moulded to bind the shaft, the rotor base and the support plate, such that the shaft, the rotor base, the support plate and the elastic material can be bound securely by the notches of the shaft, the rotor base and the support plate.

2. A support structure for a spindle motor of a compact disc machine, comprising:

a shaft;

a rotor base with a hole in its centre to accommodate the shaft; and

a support plate for supporting the disc and placed on the rotor base, with a hole in the centre of the support plate to accommodate the shaft;

wherein the shaft is placed in the holes of the rotor base and the support plate, an elastic material is casted or injection-moulded to bind the shaft, the rotor base and support plate such that the shaft, the rotor base, the support plate and the elastic material are securely joined, the elastic material comprises:

a substructure to securely bind the shaft, the rotor base and the support plate;

a central portion extending upwardly from the substructure; and

a plurality of blade-shape elements extending upwardly from the substructure and forming an arcuate curve, a ring space defined between the blade-shape elements and the central portion, a notch defined between the two blade-shape elements, with each notch receiving a hook, and a plurality of hooks extending upwardly from the substructure to lock on to a circumference of a central hole of the disc.

3. A support structure for a spindle motor of a compact disc machine, comprising:

a shaft;

a rotor base with a hole in its centre in order to accommodate the shaft; and

a support plate for supporting the disc and placed on the rotor base, with a hole in a centre of the support plate to accommodate the shaft;

wherein the shaft is placed in the holes of the rotor base and the support plate, an elastic material is casted or injection-moulded to bind the shaft, the rotor base and the support plate, such that the shaft, the rotor base, the support plate and the elastic material are securely joined, the elastic material comprises:

a substructure to securely bind the shaft, the rotor base and the support plate;

a central hub extending upwardly from the substructure to be placed in a central hole of a disc, a plurality of notches formed on a circumference of the central hub, with each notch receiving a hook, the hooks extending upwardly from the substructure and locking on to a circumference of the central hole of the disc.

4. The support structure as claimed in claim 2 or 3, wherein a protrusion is formed on a top of an outer side of the hook, for locking and fixing the disc on to the support structure.

5. A support structure for a spindle motor of a compact disc machine, comprising:

a shaft;

a rotor base with a hole in its centre to accommodate the shaft; and

a support plate for supporting the disc and placed on the rotor base, with a hole in a centre of the support plate to accommodate the shaft;

wherein the shaft is placed in the holes of the rotor base and the support plate, an elastic material is casted or injection-moulded to bind the shaft, the rotor base and the support plate such that the shaft, the rotor base, the support plate and the elastic material are securely bound, the elastic material comprises:

a substructure to securely bind the shaft, the rotor base and the support plate;

a circular hub extending upwardly from the substructure to be placed in the central hole of the disc.

6. The support structure as claimed in any one of claims 2 to 5, wherein the support plate is manufactured using the elastic material at the same time as the elastic material is casted or injection-moulded.

7. The support structure as claimed in any one of claims 2 to 6, wherein a plurality of notches are formed on a circumference at an end of the shaft, a plurality of notches are formed around the hole of the rotor base, and a plurality of notches are formed around the hole of the support plate; the shaft, the rotor base, the support plate and the elastic material are bound more securely by the notches on the shaft, the rotor base and the support plate.

8. The support structure as claimed in any one of claims 2, 4, 6 and 7, wherein a ring elastic element is placed inside the ring space to prevent the hooks from losing elasticity.

9. The support structure as claimed in claim 8, wherein a plurality of protrusions extend toward the centre point and formed on a top of a inner side of the blade-shape elements to prevent the ring elastic element from slipping away during rotation.

10. A support structure for a spindle motor of a compact disc machine, substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.